Tracking Drop Bears With GNSS

By Dr Volker Janssen

For about 50 years, the tagging and tracking of animals has been a vital tool in the quest to better understand animal behaviour and ecology. For the uninitiated, ecology is the study of the relationships living organisms have with respect to each other and their natural environment. Monitoring animal populations is also necessary for conservation.

The use of GNSS technology has yielded huge advances in this field by providing accurate and frequent measurements of the distributions of many animal species. However, employing conventional GNSS-based animal tracking methods to study the drop bear *(Thylarctos plummetus)* is extremely difficult due to its habitat. The dense tree canopy regularly causes extended periods of complete GNSS signal loss, and sensors are often damaged during attacks on prey. This severely reduces the availability of meaningful tracking data and substantially increases the cost of drop bear tracking.

Drop bear (a) in its habitat and (b) attacking prey.

Thinking Outside The Box

Recently, an alternative GNSS-based approach for tracking drop bears has been presented. Rather than attaching sensors to the animals themselves, the prey is tracked. The drop bear population is then mapped by pinpointing the location and timing of attacks. It was demonstrated that this indirect method can effectively estimate the number and spatial distribution of drop bears in a particular area.

The study has also provided valuable insights into the animal's hunting behaviour. It confirmed that foreigners are much more likely to be "dropped on" than Australians and indicated that drop bears do not necessarily target the last person walking in a line.

The research findings have been published in a trilogy of papers, all of which are available online:

- Janssen V. (2012) Indirect tracking of drop bears using GNSS technology, ***Australian Geographer***, 43(4), 445-452 (http://eprints.utas.edu.au/15881/)
- Janssen V. (2013) GNSS-based animal tracking: An indirect approach, ***Proceedings of the Association of Public Authority Surveyors Conference (APAS2013)***, 12-14 March 2013, Canberra, Australia, 120-127 (http://eprints.utas.edu.au/16293/)
- Janssen V. (2013) Tracking the prey rather than the predator with GNSS, ***Coordinates***, 9(6), 8-15 (http://eprints.utas.edu.au/16720/)

Reactions

This bush-path breaking research has attracted a lot of attention from Australia and overseas. The papers have clocked up a staggering 13,000 downloads so far. The journal paper has become the most downloaded paper in the history of the Australian Geographer (with a very healthy lead). Here are some of the comments received from academics, practitioners and people working in various government departments:

"I salute you. Your thorough investigative study on this elusive species is inspiration to us all. I have forwarded your impressive paper to various colleagues who are involved in koala management, to try and wet their appetite and take up the challenge of diversifying their efforts to include a hands-on management project of tracking drop bears in high tourist destination points around the Gippsland Lakes [Victoria]. It is general knowledge around these parts that the drop bears almost seem to have a craving for Japanese tourists visiting the Lakes system. So much so, that boat tours are now offering discount prices on neck braces and thick woollen scarves to try and thwart any attempts of a 'lock on' by any fury offender. On several occasions, I have personally witnessed drop bears launching themselves from overhanging branches of tall eucalypts onto tourist boats, grab hold on the nearest person wielding a [camera] and go for the throat. After much screaming and general panic, the bear will dislodge itself from the throat of its victim, hurl itself overboard and make a bee line for the nearest gum, smacking its bloody lips in the process."

"We incorporate drop bear numbers in our Integrated Forest Condition Assessment Methodology (IFCAM). Drop bear encounters represent an important opportunity to include citizen science in our programs, through voluntary reporting (or non-reporting, as the case may be)."

"My colleague and I frequently work in tropical woodlands and we are now far more informed on the hazard posed by ***Thylarctos plummetus***. We will adopt your GNSS technology as part of our now revised field risk assessments. I have forwarded your paper to our WHS officers regarding the threat posed to staff. This will result in a number of working parties to be established to assess insurance and WHS implications of this threat from undergraduate students through to senior staff venturing into the field. It may also impact on our international student enrolment profile, given we now need to add another venomous or dangerous animal to our list."

"It is encouraging to see that a good education is not wasted. Your research paper is outstanding. We at the National Vietnam Veterans Museum salute you. Most Australian veterans are aware of drop bears and have conscientiously offered warnings on at least one occasion to their more junior or newer members."

"I am writing to you with regards to your highly amusing article. Genius! I am especially grateful for the tips regarding Vegemite application. I don't believe GNSS has ever drawn more interest from a wider audience than when combined with one of Australia's most fascinating creatures!"

"Brilliant – I haven't laughed so much in a while! I have sent [the paper] to the rest of my branch – we have a real problem with drop bears here in Logan [Queensland], so this research is much appreciated!"

"My colleagues and I at the University of Exeter [England] are really enjoying your drop bear paper – despite our Head of School being Australian, few people had heard of drop bears and most fell for it until they hit the Vegemite section. I am a biologging ecologist and this paper is going to become a classic for my future teaching!"

"I shared the article with some friends and colleagues and all but one loved it. This one colleague almost fell for it. She checked out the Australian Museum webpage and it took a while before she cottoned on (well, she's from South Africa and has only been here a couple of years, so we'll let her off). Ah, yes, it was a good job – I especially enjoyed the references."

"I have not laughed so much in years. Your references section alone displays comic genius. The level of subterfuge you have successfully applied (and managed to get away with!) is worthy of the highest praise. You should be working for ASIO. Here's to you for making people happy!"

"This is a fan letter to tell you how much I love your drop bear paper. It is brilliantly executed – had me weeping with laughter. The references alone are very, very clever. Thank you for injecting fabulous humour and wit into the dry halls of academia."

"During times of university managerialism when 'normal' science has resurged, your article has inspired me as an outstanding example of scholarly and nationally significant research, innovative study design, and the timely dissemination of findings. I am still shaking with laughter. I am sharing the article widely – my colleagues in the Academy of Science and CSIRO are impressed by its citability."

"What a fantastic paper! I read every word. Some with a smile, often a lol, but also some sadness. I have seen too many research papers written with the same machinery. It is like some sort of algorithm or generator that produces a paper. Good on you for sending them up. Maybe the paper should be required reading for all PhD students on how to construct a journal paper, and to teach them a bit of Australia that I thought had been lost for the last 30 years. I have just added the paper to the reading list for the [students' field trip] and the suggestion that their lunch should be Vegemite sandwiches."

"Your ground breaking research on drop bears is an invaluable tool for environmental lawyers. Many thanks for this worthy contribution to the study of Australia's biodiversity. The walls were shaking with laughter this morning – we loved it! Might I humbly suggest a follow-up piece on the hoop snake or bunyip?"

Media Coverage

But wait, there's more... The study has also enjoyed significant exposure in the printed media. This included stories in ***The Register***, a science and technology news website in the U.K. (http://www.theregister.co.uk/2013/01/31/drop_bear_killer_koala_science_fun/), and ***The Conversation***, an Australian news site for academics (http://theconversation.com/cant-bear-em-how-gps-is-helping-to-track-drop-bears-12398). The ***Australian Geographic*** ran a piece (http://www.australiangeographic.com.au/journal/drop-bears-prefer-travellers-says-study.htm) that became the most visited story over a 24-hour period in the history of their website (http://www.australiangeographic.com.au/journal/drop-bears-breaks-facebook-record.htm). This media attention has not only contributed to an increased awareness of drop bears in the general public but also of GNSS technology in general.

Conclusion

Obviously, a better understanding of drop bear behaviour and ecology allows us to ensure that a sustainable population is maintained, while the possibility of attacks on humans is limited. Bushwalkers should be vigilant when hiking along less frequented paths in Australia and take precautions in areas known to be inhabited by drop bears. Thanks to the indirect GNSS-based tracking method, conservation practices can now be enhanced in these areas.

Hopefully this study and the wide-ranging interdisciplinary discussions it was able to initiate amongst professionals and the general public will contribute to a happier co-existence of drop bears and humans (and put a smile on everyone's face in the process). Here's proof that science can be heaps of fun! ▮